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(54) [Title of the Invention] **Electrically powered toothbrush**

[Claims]

[Claim 1] An electrically powered toothbrush comprising:

a drive motor housed within a case;

an attachment fixedly provided to said case;

a drive shaft supported displaceably in the axial direction within said case;

a first motion conversion mechanism for converting rotation of said drive motor to reciprocating motion and transmitting same to said drive shaft;
an extension bar linked to said drive shaft;
a rotary brush head rotatably provided to the distal end of said extension bar; and
a second motion conversion mechanism for converting reciprocating motion of said extension bar in the axial direction into rotary motion and transmitting same to said rotary brush head.

[Claim 2] The electrically powered toothbrush according to claim 1 wherein a rack for meshing with a pinion that rotates in unison with said rotary brush head is fixedly provided within said attachment,

said second motion conversion mechanism being composed of said pinion and said rack.

PATENT ABSTRACTS OF JAPAN

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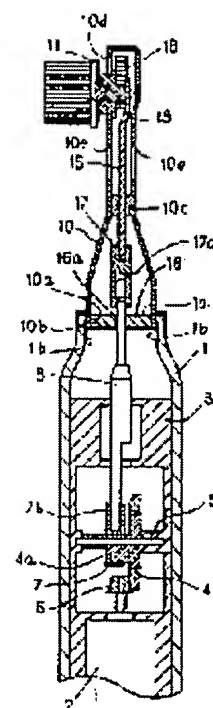
(72)Inventor : AMAKASU MIKIO

(54) MOTOR OPERATED TOOTH BRUSH

(57)Abstract:

PURPOSE: To provide a simple-structure and inexpensive motor operated tooth brush that has a higher tooth brushing ability by giving reciprocating motion to an attachment along its shaft and rotational motion to a brush.

CONSTITUTION: A drive shaft 8 is supported within a case 1 so that the shaft can move freely in the longitudinal direction, the rotation of a drive motor 2 within the case 1 is converted into a reciprocating motion by first motion conversion mechanisms 4a and 7 and is transmitted to the drive shaft 8, and this shaft 8 is connected to an extension bar 15 which has a rotatable brush 11 at its head. The reciprocating motion of the extension bar 15 is converted into a rotational motion by second motion conversion mechanisms 13 and 18, and is transmitted to the rotatable brush 11.



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CLAIMS

[Claim(s)]

[Claim 1] The drive motor formed in the interior of a case, and the attachment prepared in the above-mentioned case fixed, The driving shaft currently supported free [migration to shaft orientations] inside the above-mentioned case, and the 1st movement translator which changes rotation of the above-mentioned drive motor into a reciprocating motion, and is transmitted to the above-mentioned driving shaft, The electric toothbrush characterized by consisting of a rotation brush object prepared in the point of extension Bar connected with the above-mentioned driving shaft, and above-mentioned extension Bar free [rotation], and the 2nd movement translator which changes the reciprocating motion of above-mentioned extension Bar's shaft orientations into rotation, and is transmitted to the above-mentioned rotation brush object.

[Claim 2] The electric toothbrush according to claim 1 characterized by having prepared the rack which gears with the pinion rotated to the above-mentioned rotation brush object and one fixed in the interior of the above-mentioned attachment, and constituting the movement translator of the above 2nd with the above-mentioned pinion and the above-mentioned rack.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to an electric toothbrush.

[0002]

[Description of the Prior Art] About the electric toothbrush, many things are proposed conventionally and a variety of electric toothbrushes are marketed till today. the thing it was made to drive to the longitudinal direction by the motor which has prepared the typical thing free [migration] and free [attachment and detachment] also in it relatively [the attachment which has a brush object in the upper limit section / case], and has been formed in the interior of a case -- or there is a thing it was made to drive the brush object itself instead of an attachment. For example, the electric toothbrush with which it was made for the hair ends of a brush to vibrate finely is indicated by JP,61-55963,B. Moreover, the electric toothbrush which makes the gear-tooth brush attached in the driving shaft reciprocate along the shaft orientations or the direction of an axial right angle is indicated by JP,61-64204,A. The electric toothbrush which made adjustable the stroke of reciprocation of the shaft orientations given to a gear-tooth brush is indicated by JP,61-79410,A further again.

[0003]

[Problem(s) to be Solved by the Invention] In what gave a fine vibration to the gear-tooth brush among the above-mentioned Prior arts, when the body of a gear-tooth brush is grasped strongly, this fine vibration is absorbed, and the vibration displacement of a brush object becomes close to zero, and is inferior to the toothbrushing effectiveness. Moreover, in what gave movement to the attachment section (part equivalent to the shank of the usual gear-tooth brush) which has a brush object, the brush object itself has fixed to the attachment and it is immobilization. So, in this invention, it aims at offering cheaply the electric toothbrush which was excellent in the toothbrushing effectiveness with an easy configuration by giving rotation to the brush object itself at the same time it gives the reciprocating motion in alignment with the shaft orientations of an attachment to a brush object.

[0004]

[Means for Solving the Problem] The driving shaft is supported by this invention free [migration to shaft orientations] within a case. Rotation of the drive motor formed in this case is changed into a reciprocating motion by the 1st movement translator, and is transmitted to a driving shaft. The rotation brush object is prepared in the point of the extension bar connected with this driving shaft free [rotation], and the reciprocating motion of the shaft orientations of this extension bar is changed into rotation by the 2nd movement translator, and is transmitted to a rotation brush object. The 2nd movement translator is constituted by the pinion which gears with the rack prepared in the interior of the attachment fixed to the case fixed on this rack, and is rotated to a rotation brush object and one.

[0005]

[Function] The own reciprocating motion of an extension bar is changed by the 2nd movement translator, and is transmitted to the rotation brush object in the point of an extension bar, and this rotation brush object rotates at the same time rotation of the motor formed in the case is changed by the

1st movement translator, and is transmitted to a driving shaft and an extension bar reciprocates to this driving shaft and one.

[0006]

[Example] The example of this invention is explained with reference to a drawing. As shown in drawing 1 and 2, DC motor 2 which makes a driving source the dry cell which is not illustrated is provided in the case 1 bell shape interior which has opening 1a in upper limit through the supporter material 3. The bevel gear 4 is formed in the supporter material 3 free [rotation] through the shaft 5. The tooth part of this bevel gear 4 has geared with the motor pinion 6 prepared in DC motor 2.

[0007] Eccentric-cam 4a is formed in the lateral portion of a bevel gear 4 at one, and the cam follower 7 is engaging with this eccentric-cam 4a. The cam follower 7 had opening 7a which has height equal to the diameter of eccentric-cam 4a as shown in drawing 1, and eccentric-cam 4a has fitted in in this opening 7a. One direction rotation centering on the shaft 5 of a bevel gear 4 is changed into the reciprocating motion of the vertical direction by the cam follower 7 which follows rotation of eccentric-cam 4a. This eccentric-cam 4a and cam follower 7 constitute the 1st movement translator which changes rotation of DC motor 2 into a reciprocating motion. In the center of the upper part of the supporter material 3, the driving shaft 8 is supported free [sliding] in accordance with the shaft orientations (the vertical direction of drawing 1). The lower limit section of a driving shaft 8 has connected with arm section 7b of the cam follower 7 upper part, and the reciprocating motion of the vertical direction of a cam follower 7 is transmitted to this driving shaft 8. In addition, it is prevented that the water which invaded from upper limit opening 1a of a case 1 trespasses even upon the case 1 interior in which DC motor 2 and the bevel gear 4 grade are prepared by the supporter material 3. The lower limit is equipped with the attachment 10 which has opening 10a free [attachment and detachment] at upper limit opening 1a of a case 1. Two or more engagement pawl 10b is formed in the lower limit of an attachment 10, and when this engagement pawl 10b engages with engagement crevice 1b currently formed in a case 1 upper-limit inside, opening 1a of a case 1 is equipped with an attachment 10. Two or more heights 10c is formed in the interior of an attachment 10. It is supported so that the extension bar 15 can slide freely in accordance with those shaft orientations (the vertical direction of drawing 1) by this heights 10b inside an attachment 10. In the upper limit section of the extension bar 15, the pinion 13 is supported to revolve free [rotation]. That part has projected this pinion 13 outside from 10d of long holes currently formed in the upper limit section of an attachment 10, and the rotation brush object 11 which has two or more brushes is formed in this protrusion edge free [attachment and detachment]. The rack 18 prepared in the interior of an attachment 10 fixed and engagement are possible for the tooth part of a pinion 13. In addition, weep hole 10e for draining the water which invaded from between an attachment 10 and the rotation brush objects 11 is formed in the peripheral face of an attachment 10. The packing 16 which has through tube 16a in the center is fixed to the lower part of an attachment 10. When upper limit opening 1a of a case 1 is equipped with an attachment 10, the upper limit section of a driving shaft 8 carries out the penetration protrusion of the through tube 16a of packing 16, and advances inside an attachment 10. In the lower limit section of the extension bar 15, the connection coupler 17 which has opening 17a in the lower limit is fixed. Opening 17a of this connection coupler 17 connects with the upper limit section of the fixed shaft 9. Therefore, the extension bar 15 exercises in the vertical direction to a case 1 and the attachment 10 of this case 1 and one united with a driving shaft 8. For this reason, as shown in drawing 3, the pinion 13 currently supported to revolve in this extension bar 15 upper-limit section carries out both-way rotation of the rack 18 top fixed to the attachment 10 interior by rolling and moving with vertical motion of the extension bar 15. Rotation of this pinion 13 is directly transmitted to the rotation brush object 11, and the rotation brush object 11 carries out both-way rotation.

[0008] Thus, the pinion 13 and the rack 18 constitute the 2nd movement translator which changes the reciprocating motion of the vertical direction (shaft orientations) of the extension bar 15 into rotation. Actuation is explained below. Case 1 peripheral face is grasped, and if the switch which does not illustrate is turned ON, DC motor 2 will rotate. Rotation of DC motor 2 is changed into the reciprocating motion of the longitudinal direction of a case 1 through the motor pinion 6 and a bevel gear 4 by eccentric-cam 4a and the cam follower 7 which are the 1st movement translator, it is transmitted to a

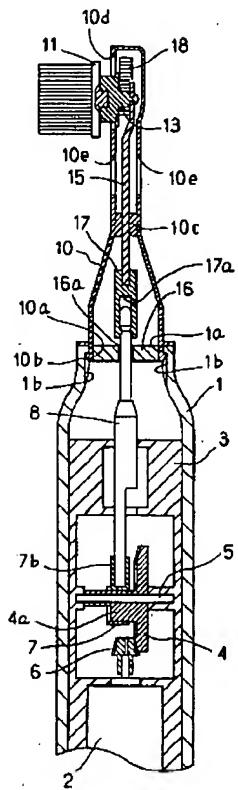
driving shaft 8, and this driving shaft 8 and the extension bar 15 of one reciprocate in the vertical direction to a case 1. If the extension bar 15 exercises in the vertical direction, both-way rotation of the rack 18 top with which the pinion 13 currently supported to revolve in this extension bar 15 upper-limit section is fixed to the attachment 10 interior will be carried out by rolling and moving (refer to drawing 3), and the rotation brush object 11 will carry out both-way rotation. In addition, although eccentric-cam 4a and a cam follower 7 constitute the 1st movement translator which changes rotation of DC motor 2 into a reciprocating motion from this example, it is not limited to this and various approaches, such as a link mechanism and a slider style, can be considered. Moreover, although the pinion 13 and the rack 18 constitute the 2nd movement translator which changes the reciprocating motion of the vertical direction (shaft orientations) of the extension bar 15 into rotation, it is not limited to this and various approaches, such as a link mechanism and a slider style, can be considered.

[0009]

[Effect of the Invention] Since rotation can be given to the brush object itself while giving the reciprocating motion in alignment with the shaft orientations of an attachment to a brush object according to the electric toothbrush of this invention, as explained above, the electric toothbrush which was excellent in the toothbrushing effectiveness can be cheaply offered with an easy configuration.

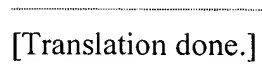
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Drawing selection Representative drawing

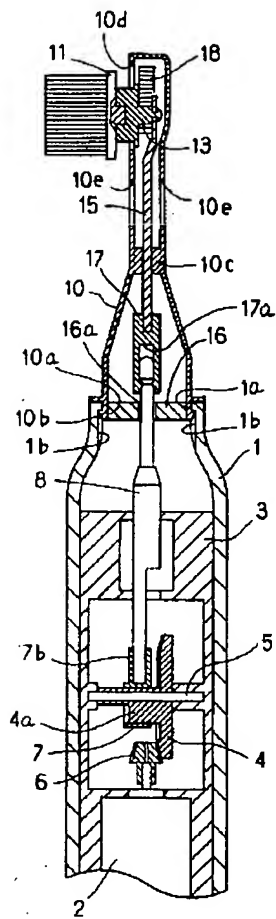


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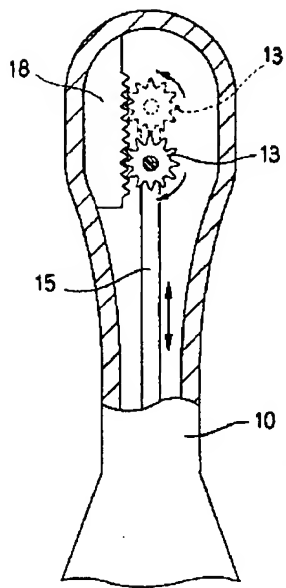


Drawing selection [drawing 2]



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Drawing selection [drawing 3]



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